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LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

The study of logic in the scientific schools.

THAT logic should be thoroughly studied in our scientific schools is a thesis which we support most strenuously, but, so far as we know, without the indorsement of any of the faculties of those schools. At all events, such courses of study in scientific schools as have come to our notice, make no provision whatsoever for the study of logical science.

The reason for this is, perhaps, indifference on the part of the faculties; but we think it more likely to be the crowded condition of the scientific curriculum. That the last mentioned is a legitimate excuse, may be seen from the fact that our scientific schools are continually raising the standard of the entrance examinations, so putting as much work as possible into the preparatory years. A glance at the catalogue of any first-class institution will show this, as well as that the four years of the course are even now fully occupied. In the School of mines of Columbia college, for instance, a student of the second-year class must pursue fourteen or fifteen subjects; and five hours of attendance are the average number required of him each day. With the students of the third and fourth year classes the case is the same. Even if members of the first-year class had the time, they are too immature, and not sufficiently advanced, to gain the desired benefit from logical study.

Of course there can be no two opinions as to the feasibility of adding logic to such a curriculum as this. There is absolutely no time for it.

Our point is, that logic should have time made for it, and for two main reasons. First, because of its importance to the intellectual culture of the student; and, secondly, because of its importance to the value of any subsequent thought and investigation. As an intellectual gymnastic, logic, when properly apprehended and taught, is superior even to mathematics, and capable of far more general and varied application. The truth of this statement does not depend upon the dogma of any of the much-despised class of 'mediaeval metaphysicians,' but numbers among its defenders men of the intellectual stamp of Jevons and John Stuart Mill.

But this is not the main support of our present argument. We prefer to lay more stress upon the second specification; namely, the great importance of a logical training for the value of any scientific work.

As a matter of course, we do not mean by logic any dry rattling of syllogistic bones, important as a knowledge of the syllogistic process and rules certainly is. But we have in mind such a treatment of the great philosophical organon as will introduce our scientific students to the elements of a theory of knowledge, teach them the nature and relations of the mental processes involved in a train of reasoning or proof, investigate with them the nature, limits, and canons of hypothesis and inductive inquiry, and discuss the nature of evidence, and the theories of proof and probability. All of these subjects should be familiar ground to every man of science, young or old. His work should be along the lines laid down by a correct logic, and his conclusions conformable to its canons. The logical writings of Herschel, Whewell, and Mill offer innumerable examples of the value of strictly logical processes applied to scientific investigation; and our common sense must assuredly emphasize their testimony.

The truth is that many an absurd deduction, many a false inference, would be avoided, were the investigator in possession of some knowledge of elementary logic. To say that men have reasoned and do reason correctly without logic, is no answer. So do children count marbles correctly while yet in ignorance of the rule for long division and the multiplication table. Not only does logic aid and clarify men's reasoning, and give it a defensible foundation to stand on, but it is the instrument for the detection and explanation of fallacies and false steps in scientific investigations by whomsoever they are made.

Other and cogent reasons for the acceptance of our thesis could be easily urged. But those just briefly stated seem to us sufficient at this time and place.

The instruction we plead for need not be elaborate. It need not be on the same scale as that desired by a specialist in mental science. A competent instructor could probably make two hours a week for a half-year suffice for what we have sketched above as desirable. And to secure the benefits that would arise from that instruction, we claim that any faculty in the land should gladly rearrange its course of study.

NICHOLAS MURRAY BUTLER.

Color and other associations.

In 1880, while I was in Washington, I read Mr. F. Galton's note on 'Visualized numerals,' in *Nature* of Jan. 15 of that year.

After I came to Madison, probably late in 1881, or early in 1882, I mentioned my own entire inability to visualize numerals, or any thing else of the kind, to a member of the university faculty, Professor O. I was interested to learn, that, when a boy, he had always conceived the vowel sounds as having color, and that he still retained some traces of this early habit.

I spoke of this subject at my dinner-table shortly after; and my daughter Mildred, then about eight years old, said she also had colors for the days of the week, as follows: Monday, *blue*; Tuesday, *pink*; Wednesday, *brown or gray*; Thursday, *brown or gray*; Friday, *white*; Saturday, *pure white*; Sunday, *black*. It was said laughingly; and at the time it passed to my mind as a joke — that she wished in sport to assume the idiosyncrasies of elder persons. A few days after, I questioned her on these colors; and she gave the same replies. It was again spoken of as a kind of joke and a question of memory, but I wrote the colors down in my memorandum-book for 1882. A year later I produced this, and again questioned her, this time seriously, and found her answers the same as at first. Again, Aug. 5, 1885, her replies were the same. The tenacity of a child's memory is very remarkable; but I was convinced this was not a case of memory and imagination, but a true phenomenon of the kind referred to. I therefore went farther, and asked her if there were any other phenomena of the same kind (she is now eleven and a half years old). I found that each of the letters of the alphabet had a color to her, as follows: —

A, white; B, blue; C, yellow, cream color; D, dark blue; E, red; F, black; G, green; H, white; I, black; J, gray, brown; K, gray; L, dark blue; M, N, brown, not much color; O, yellow; P, green; Q (?) R, brown; S, yellow; T, green; U, yellow; V, white; W, brown; X, Y, not much color; Z, greenish.

The prevalence of yellow and green, and the scarcity of reds and pinks, are noteworthy. I found she knew these colors instantly, and when I asked for them in any order. What is more remarkable, she can instantly name the brown letters in a group, the

black ones, etc. Apparently she does not require to pass the alphabet in review to decide this. The numbers also have colors to her, as follows:—

1, black; 2, cream color; 3, light blue; 4, brown; 5, white; 6, crimson, pink; 7, greenish; 8, white; 9, greenish (?) 10, brown; 11, black; 12, cream color; 13, blue; 14, brown; 15, white: that is, 11 has the same color as 1, 12 as 2, 13 as 3, etc. These colors are also named instantly, and in any order, and in groups.

No other member of my family has this idiosyncrasy. A cousin, Miss S., staying with me, arranges the months in an ellipse, in her mind. The major axis of the ellipse is conceived to be horizontal. March is at the left hand, October at the right, July at the upper extremity of the minor axis, January at the lower. The other months occupy equal spaces between those already named. Hence it follows that their lengths are conceived as unequal. Half the ellipse is occupied by the five months, October to March. The direction of motion round the ellipse is indifferent, left-right or right-left. This ellipse is conceived of as having absolute dimensions. The major axis is taken as about three and a quarter inches. In this connection I would refer to *Science*, July 31 and Aug. 21.

These cases appear to me sufficiently noteworthy to deserve this record in passing.

EDWARD S. HOLDEN.

Madison, Sept 7.

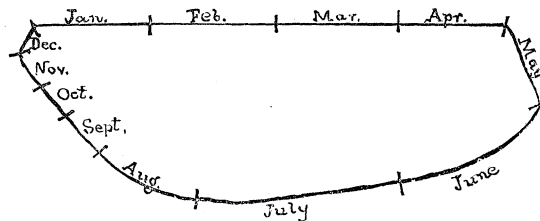
In my mind, there has always been associated with every name or word a color, or shade of color. With some names the color is clear and well defined, with others somewhat vague. I can only distinguish them as light or dark. I give you a few instances: In my mind, John, Jane, Ann, Mary, are red; William, Walter, Robert, blue; George, Nathan, Gilbert, white; Joseph, black; Mark, Judas, Humphrey, brown; James, yellow.

New York, red; Chicago, light; St. Louis, reddish; Portland, dark; San Francisco, yellowish; Leadville, gray; Denver, yellow; St. Paul, dark, etc. I never mentioned this, excepting once or twice when a boy, and was laughed at as trying to say something peculiar.

GEO. S. MILLER.

St. Paul, Minn.

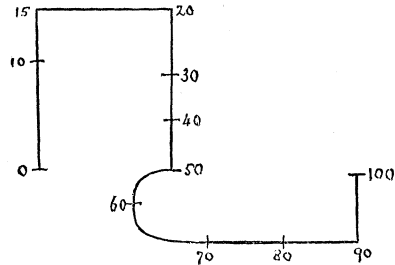
Mr. Ruheit's diagram of the months of the year as pictured in his mind, and as represented in *Science* of Aug. 21, is so strikingly similar to a conception of my own, that I am led to present my diagram also.



The similarity seems very remarkable to me. I cannot explain the *raison d'être* of the diagram. Perhaps, as most boys go through about the same alternations of rest and work during their earlier years, Mr. Ruheit's explanation may apply here, and may also account for the similarity of the diagrams.

A diagram of numbers which also forms itself in

my mind, is of peculiar form, and is equally difficult to explain.



I cannot think of any number less than a hundred, that does not place itself immediately in its appropriate place in the diagram.

ARTHUR WINSLOW.

Raleigh, N.C., Aug. 27.

The ginkgo-tree.

The paper on *Salisburia adiantifolia*, illustrating the 'phylogeny' of the genus Ginkgo, by Lester F. Ward, in *Science* for June 19, is one of great interest to botanists. In the Central Park we have a group of six trees in close proximity to each other, and which bear fruit abundantly. The group is composed of three males and three females, and for the past four years have borne an abundance of fruit. I herewith send you a photograph of a fruiting-branch, which will give an exact idea of how it appears.

E. B. SOUTHWICK,
Botanist and entomologist.

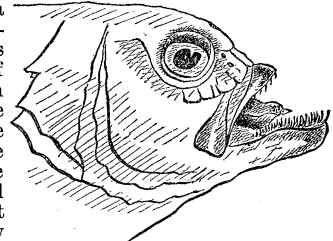
Department of public parks,
Central Park, New York, Aug. 28.

An abnormal black bass.

A black bass, weighing upwards of half a pound, was caught at Webster Lake, Franklin, N.H., Aug. 21, 1885, by Mr. Charles Aiken. The head of this fish presented a singular abnormality, which seemed worthy of a short notice.

The malformation was apparently restricted to the forehead and upper jaw. In other respects, the fish seemed to be normally developed, and in good condition.

The lower jaw was of proper size, and, when the mouth closed, protruded seven millimetres beyond its fellow, exposing the tongue for a length of three millimetres from its tip. This state of things gave the fish a very grotesque appearance, the 'nose' rising quite abruptly to the 'forehead' instead of making with it the customary straight line. The teeth of the lower jaw were entirely exposed, and, not meeting those of the superior maxillary, had become very numerous, and nearly twice their natural size, the exterior curving outward. The vomerine teeth, and those of the upper jaw which met the tongue, were about normal. The exposed parts of the mouth were unduly pigmented;



MICROPTERUS SALMOIDES (LAC.) GILL.
MALFORMED.